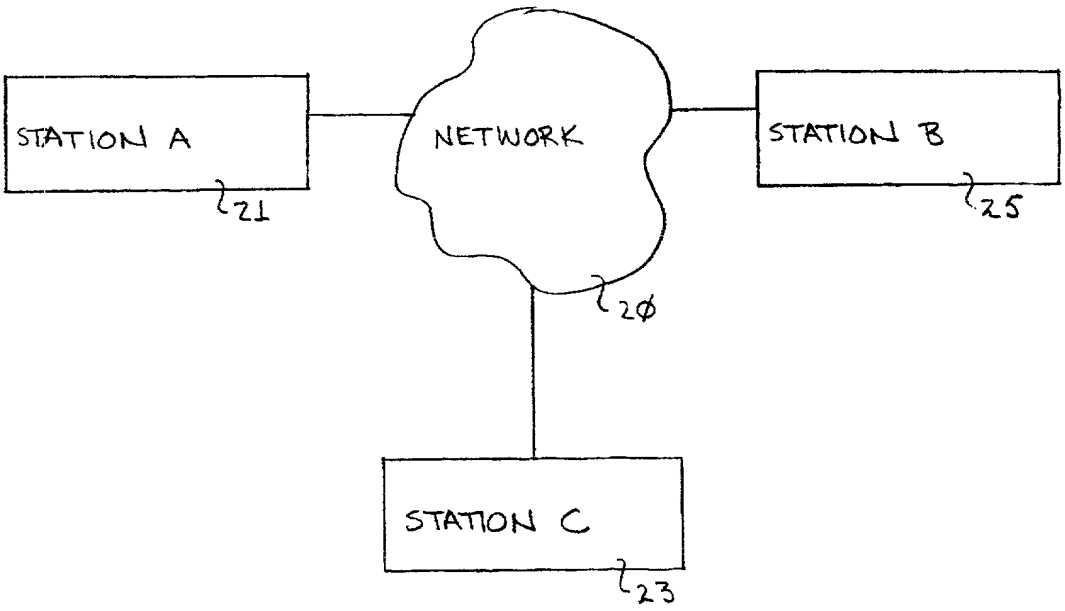

FIG. 1

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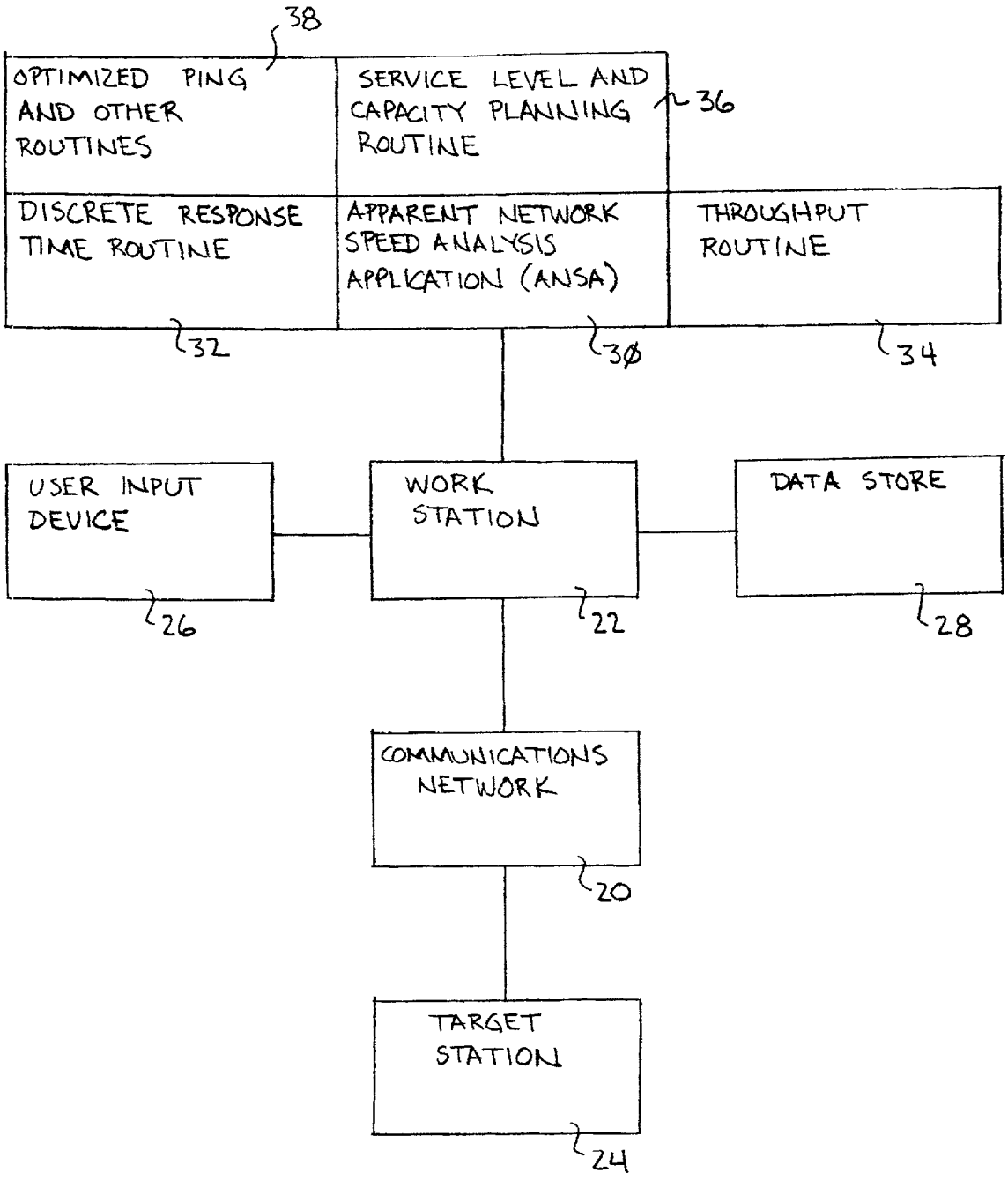
38
OPTIMIZED PING AND OTHER ROUTINES
SERVICE LEVEL AND CAPACITY PLANNING ROUTINE
36
DISCRETE RESPONSE TIME ROUTINE
APPARENT NETWORK SPEED ANALYSIS APPLICATION (ANSA)
THROUGHPUT ROUTINE
32
30
34
USER INPUT DEVICE
WORK STATION
DATA STORE
26
22
28
COMMUNICATIONS NETWORK
20
TARGET STATION
24

FIG. 2

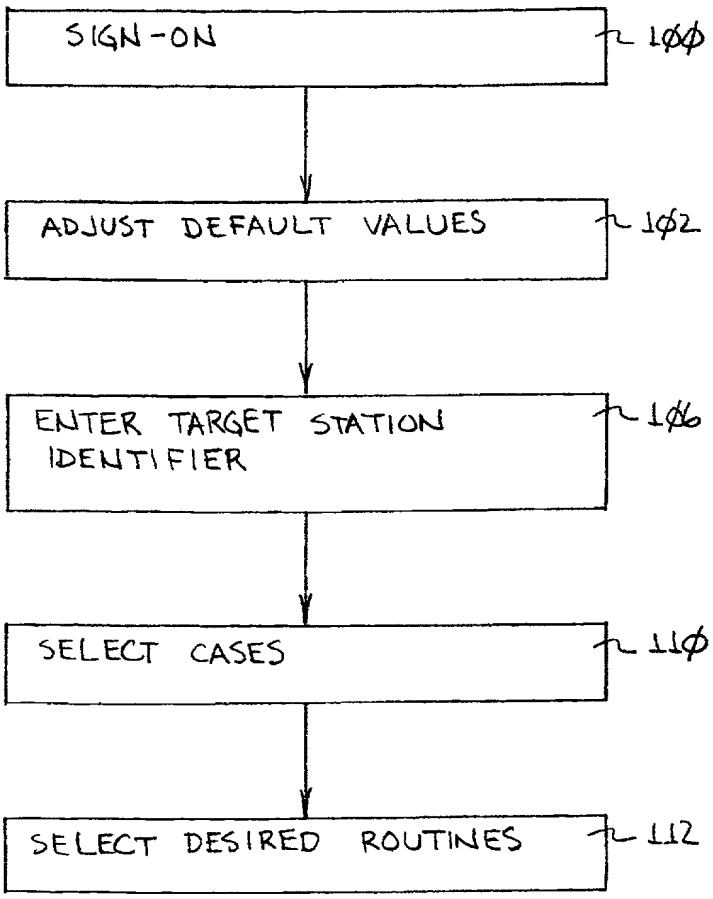
SIGN-ON
100
ADJUST DEFAULT VALUES
102
ENTER TARGET STATION IDENTIFIER
106
SELECT CASES
110
SELECT DESIRED ROUTINES
112

FIG. 3

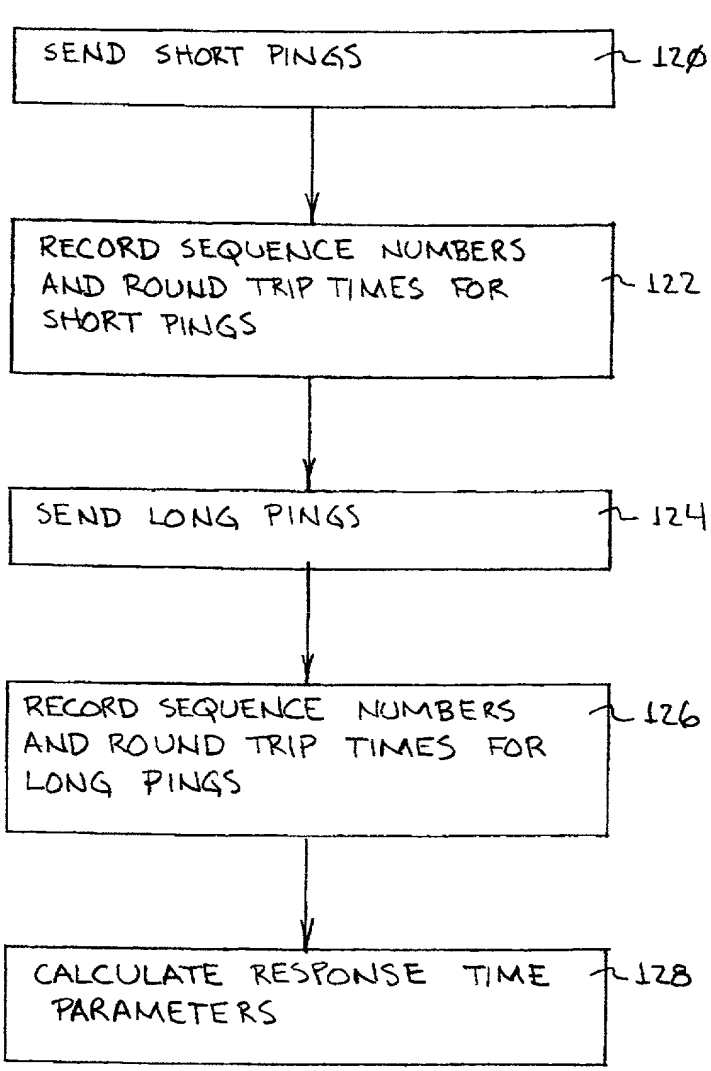
RESPONSE TIME ROUTINE
SEND SHORT PINGS
120
RECORD SEQUENCE NUMBERS AND ROUND TRIP TIMES FOR SHORT PINGS
122
SEND LONG PINGS
124
RECORD SEQUENCE NUMBERS AND ROUND TRIP TIMES FOR LONG PINGS
126
CALCULATE RESPONSE TIME PARAMETERS
128

FIG. 4

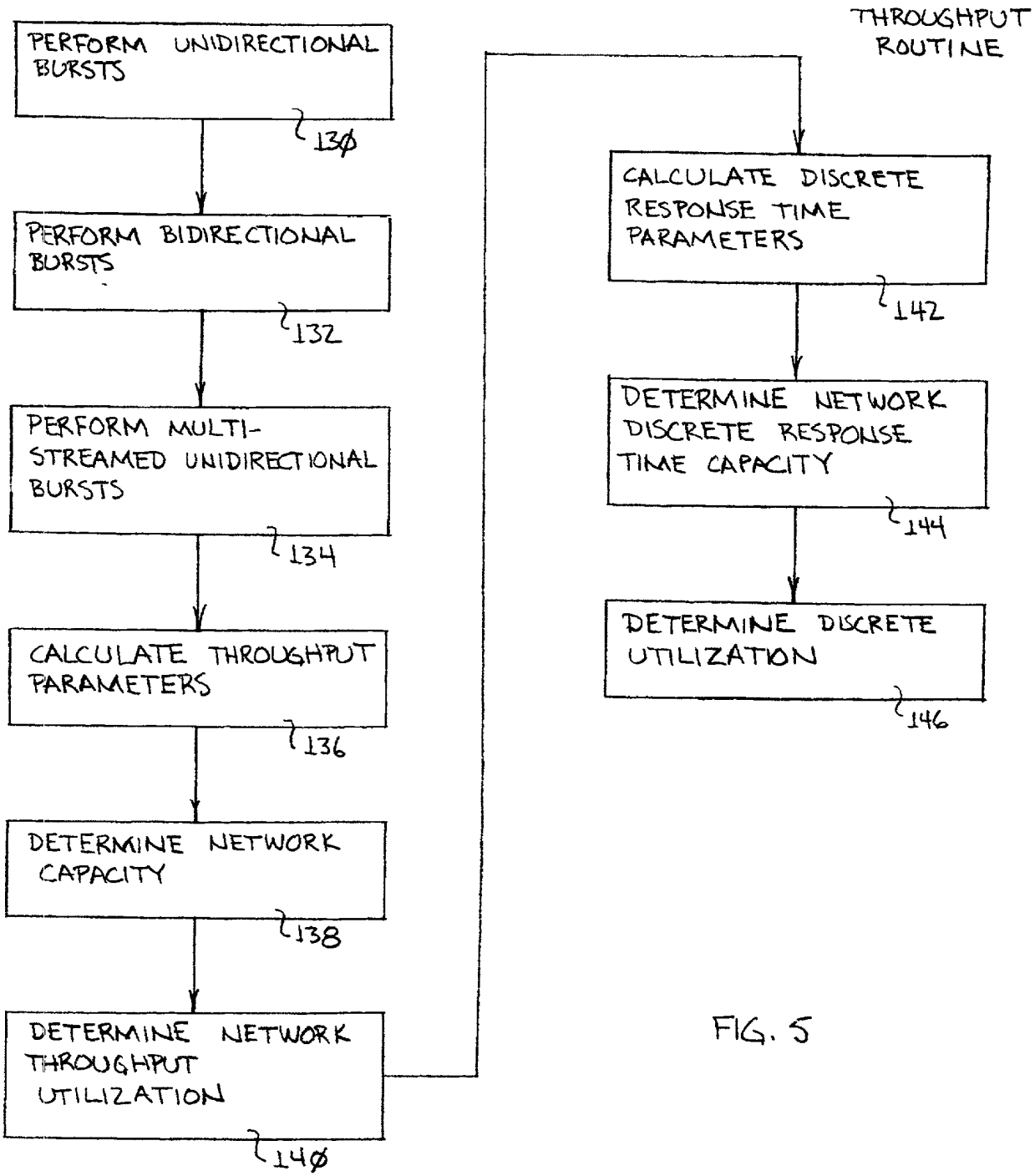
THROUGHPUT ROUTINE
PERFORM UNIDIRECTIONAL BURSTS
130
PERFORM BIDIRECTIONAL BURSTS
132
PERFORM MULTI-STREAMED UNIDIRECTIONAL BURSTS
134
CALCULATE THROUGHPUT PARAMETERS
136
DETERMINE NETWORK CAPACITY
138
DETERMINE NETWORK THROUGHPUT UTILIZATION
140
CALCULATE DISCRETE RESPONSE TIME PARAMETERS
142
DETERMINE NETWORK DISCRETE RESPONSE TIME CAPACITY
144
DETERMINE DISCRETE UTILIZATION
146

FIG. 5

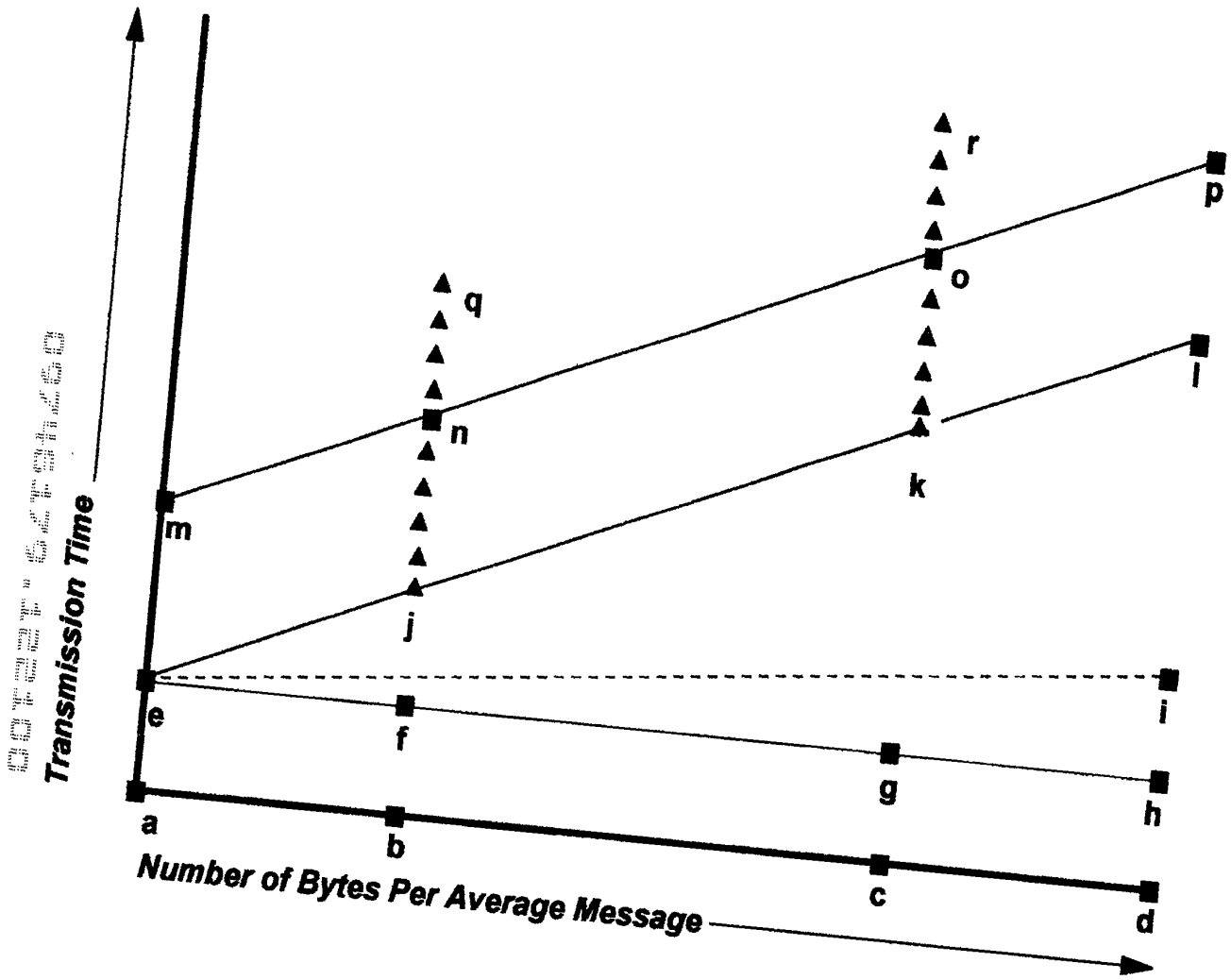
Transmission Time
Number of Bytes Per Average Message
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r

FIG. 6

ROW	A PING DELTAS	B SAMPLE
6	0	1
7	0.00092	2
8	0.00097	3
9	0.00191	4
10	0.00347	5
11	0.00452	6
12	0.00536	7
13	0.00632	8
14	0.00729	9
15	0.01133	10
16	0.00421	T_W
17	0.00333	σT_W

J	
383000	OBSERVED LINE SPEED
61476	OBSERVED DISCRETE SPEED
3.1150368	HOP COUNT (TWO WAY)
0.0013513	OBSERVED T_W FOR HOP COUNT
0.0033311	OBSERVED σT_W

	A	B	C	D	E	F	G	
25	0.33	0.34	0.35	0.36	0.37	0.38	0.39	MAXU
26	0.985	1.030	1.077	1.125	1.175	1.226	1.279	MAX M
27	0.316	0.331	0.346	0.361	0.377	0.394	0.410	MIN M
28	0.24	0.25	0.26	0.27	0.27	0.28	0.29	MIN U
29	0.369	0.377	0.384	0.391	0.398	0.405	0.413	RATIO 1
30	0.406	0.406	0.406	0.406	0.406	0.406	0.406	RATIO 2

32	0.33	DISCRETE UTILIZATION (AVERAGE)
33	0.0013513	T_W
34	0.495	MESSAGES ON QUEUE
35	383000	SPEED THIS HOP
36	1045	NETWORK AVERAGE MESSAGE SIZE

FIG.7

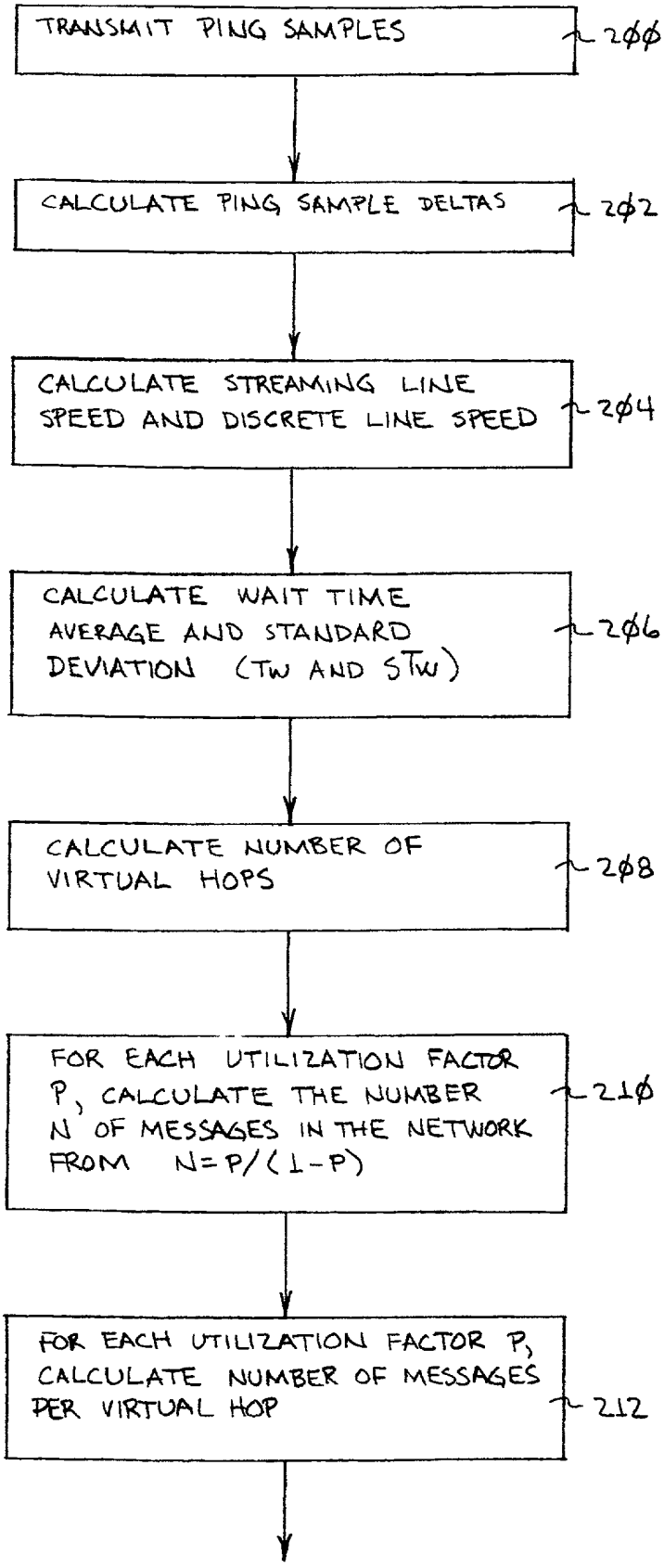
TRANSMIT PING SAMPLES
200
CALCULATE PING SAMPLE DELTAS
202
CALCULATE STREAMING LINE SPEED AND DISCRETE LINE SPEED
204
CALCULATE WAIT TIME AVERAGE AND STANDARD DEVIATION (TW AND STW)
206
CALCULATE NUMBER OF VIRTUAL HOPS
208
FOR EACH UTILIZATION FACTOR P, CALCULATE THE NUMBER N OF MESSAGES IN THE NETWORK FROM N=P/(1-P)
210
FOR EACH UTILIZATION FACTOR P, CALCULATE NUMBER OF MESSAGES PER VIRTUAL HOP
212

FIG. 8A

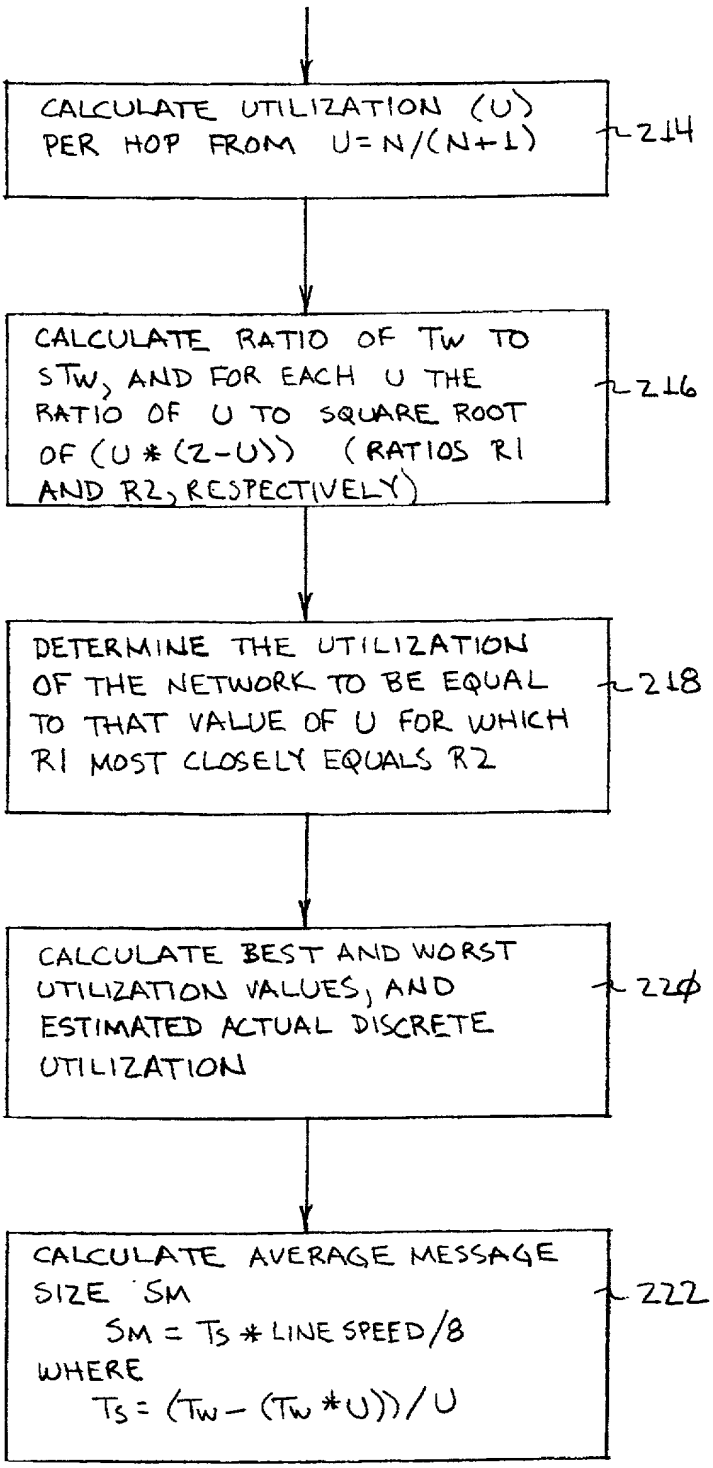
CALCULATE UTILIZATION (U) PER HOP FROM U=N/(N+1)
214
CALCULATE RATIO OF Tw TO STw, AND FOR EACH U THE RATIO OF U TO SQUARE ROOT OF (U*(2-U)) (RATIOS R1 AND R2, RESPECTIVELY)
216
DETERMINE THE UTILIZATION OF THE NETWORK TO BE EQUAL TO THAT VALUE OF U FOR WHICH R1 MOST CLOSELY EQUALS R2
218
CALCULATE BEST AND WORST UTILIZATION VALUES, AND ESTIMATED ACTUAL DISCRETE UTILIZATION
220
CALCULATE AVERAGE MESSAGE SIZE SM
SM = Ts * LINE SPEED/8
WHERE
Ts = (Tw - (Tw * U))/U
222

FIG. 8B